

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-31214-1

TestAmerica Sample Delivery Group: PFAS  
Client Project/Site: BNL - PFAS

For:

Brookhaven National Labs  
Contracts Section  
Building 134B  
Upton, New York 11973

Attn: Mr. Bob Howe



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Authorized for release by:  
10/31/2018 1:34:32 PM

Ivan Vania, Project Manager II  
(314)298-8566  
[ivan.vania@testamericainc.com](mailto:ivan.vania@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Job ID: 160-31214-1**

**Laboratory: TestAmerica St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Brookhaven National Labs**

**Project: BNL - PFAS**

**Report Number: 160-31214-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

### RECEIPT

The samples were received on 10/9/2018 9:24 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 0.5° C and 1.0° C.

### FLUORINATED ALKYL SUBSTANCES

Samples 199-929-181001 BR030R (160-31214-2), 199-929-181001 BR030RDUP (160-31214-3), 001-929-181001 BR021GACION (160-31214-4), 200-929-181001 BR021R (160-31214-5), 003-929-181001 BR041GACION (160-31214-6), 201-929-181001 BR041R

# Case Narrative

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

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## Job ID: 160-31214-1 (Continued)

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### Laboratory: TestAmerica St. Louis (Continued)

(160-31214-7), 202-929-181001 BR041R (160-31214-8), EB-929-181002 (160-31214-28), 203-929-181002 BR017R (160-31214-29), 203-929-181002 BR017RDUP (160-31214-30), 001-929-181002 BR017GACIONPH (160-31214-31), 002-929-181002 BR017ROGACIONPH (160-31214-32) and 204-929-181002 BR037R (160-31214-33) were analyzed for Fluorinated Alkyl Substances in accordance with PFAS\_DI\_DW. The samples were prepared on 10/19/2018 and 10/20/2018 and analyzed on 10/21/2018 and 10/23/2018.

Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for <sup>13</sup>C<sub>4</sub> PFOA in the following sample: 199-929-181001 BR030R (160-31214-2[MSD]). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Sample EB-929-181001 (160-31214-1) was initially prepared by an incorrect method. There was no matrix left for re-preparation. No results were reported for this sample.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.







**TestAmerica Sacramento**

880 Riverside Parkway  
West Sacramento, CA 95605  
Phone 916-374-4308

**Chain of Custody Record: Drinking Water**

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING

NYS

46050

<b>Client Information</b>		Sampler Abazis	Lab PM Ivan, Ivanna	Tracking No(s) 46050	CCC No 460-03080-58844-1																																																																																																																																																																																																																								
Client Contact Mr. Ian Hofmann - Anthony Condos		Phone 631-852-5810	E-Mail ivan.vanania@testamerica.com melissa.hadas@testamerica.com	Page Page of																																																																																																																																																																																																																									
Company Env Assessment & Remediation Suffolk County Dept. of Health Services		<b>Analysis Requested</b>			Job #																																																																																																																																																																																																																								
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THE LEADER IN ENVIRONMENTAL TESTING

Sacramento  
Sample Receiving Notes

Job: \_\_\_\_\_

Tracking # 4137 2536 4573 SO (PO) / FO / 2-Day / SAT / Ground / UPS / Courier /  
Drop Off / GSO / OnTrac / Goldstreak / USPS / Other \_\_\_\_\_

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations. File in the job folder with the COC.

Notes: \_\_\_\_\_  
\_\_\_\_\_  
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Therm. ID: AK-2 / AK-3 / AK-5 / AK-6 / HACCP / Other \_\_\_\_\_  
(+0.7°C)

Ice \_\_\_\_\_ Wet \_\_\_\_\_ Gel \_\_\_\_\_ Other \_\_\_\_\_

Cooler Custody Seal: 998271

Sample Custody Seal: \_\_\_\_\_

Cooler ID: 2 of 2

Temp: Observed 0.3 Corrected 0.3

From: Temp Blank  Sample

NCM Filed: Yes  No

	Yes	No	NA
Perchlorate has headspace?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Alkalinity has no headspace?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CoC is complete w/o discrepancies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample preservatives verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cooler compromised/tampered with?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples compromised/tampered with?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples w/o discrepancies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample containers have legible labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Containers are not broken or leaking?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample date/times are provided.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Appropriate containers are used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample bottles are completely filled?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zero headspace?*	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Multiphasic samples are not present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample temp OK?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample out of temp?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Initials: MGT Date: 10-9-18

\*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

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**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
 998272

Part # 159/69-434 RIT2 EXP 07/19

ORIGIN ID:LDJA (732) 549-3900  
 KENNETH RIVERA/SAMPLE RECEIVING  
 TESTAMERICA EDISON  
 777 NEW DURHAM ROAD

SHIP DATE: 08OCT18  
 ACTWGT: 69.90 LB  
 CAD: 0358159/CAFE3211

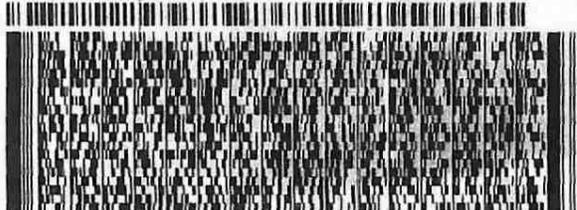
EDISON, NJ 08817  
 UNITED STATES US

BILL RECIPIENT

TO **SAMPLE CUSTODY**  
**TEST AMERICA SACRAMENTO**  
**880 RIVERSIDE PARKWAY**  
  
**WEST SACRAMENTO CA 956051500**

PROV/MPFR/L153

INU: REF: DEPT:  
 PO:

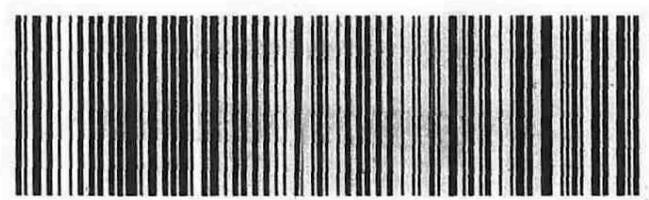


1 of 2  
 TRK# 4137 2536 4562  
 0201  
 ## MASTER ##

**TUE - 09 OCT 10:30A**  
**PRIORITY OVERNIGHT**

**XH BLUA**

**95605**  
**CA-US SMF**



RT 362  
FZ  
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A  
10-25-79

Part # 159468-434 RIT2 EXP 07/19

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
998271

ORIGIN ID:LDJA (732) 549-3900  
KENNETH RIVERA/SAMPLE RECEIVING  
TESTAMERICA EDISON  
777 NEW DURHAM ROAD

SHIP DATE: 08OCT18  
ACTWGT: 70.75 LB  
CAD: 0358159/CAFE3211

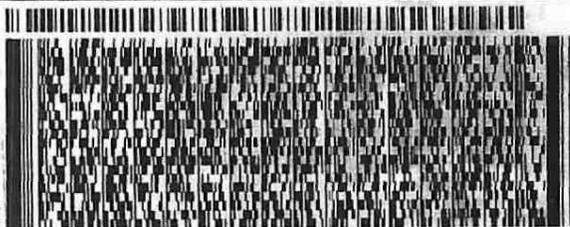
EDISON, NJ 08817  
UNITED STATES US

BILL RECIPIENT

TO **SAMPLE CUSTODY**  
**TEST AMERICA SACRAMENTO**  
**880 RIVERSIDE PARKWAY**

**WEST SACRAMENTO CA 956051500**

REF: INU: PD: DEPT:



**FedEx**  
Express



2 of 2

MPS# 4137 2536 4573  
0263

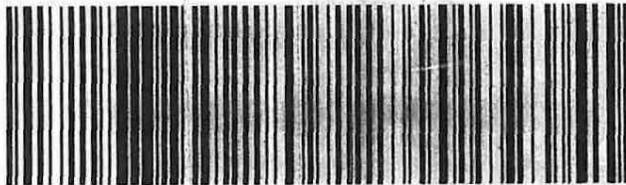
Mstr# 4137 2536 4562

0201

**TUE - 09 OCT 10:30A**  
**PRIORITY OVERNIGHT**

**XH BLUA**

**95605**  
CA-US **SMF**







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**TestAmerica**  
 THE LEADER IN ENVIRONMENTAL TESTING  
 998272

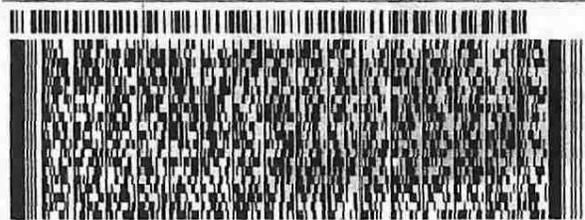
Part # 159469-434 RIT2 EXP 07/19

ORIGIN ID:LDJA (732) 549-3900  
 KENNETH RIVERA/SAMPLE RECEIVING  
 TESTAMERICA EDISON  
 777 NEW DURHAM ROAD  
 EDISON, NJ 08817  
 UNITED STATES US

SHIP DATE: 08OCT18  
 ACTWGT: 89.90 LB  
 CAD: 0358159/CAFE3211  
 BILL RECIPIENT

**TO SAMPLE CUSTODY**  
**TEST AMERICA SACRAMENTO**  
**880 RIVERSIDE PARKWAY**  
  
**WEST SACRAMENTO CA 956051500**

INU: REF: PO: DEPT:

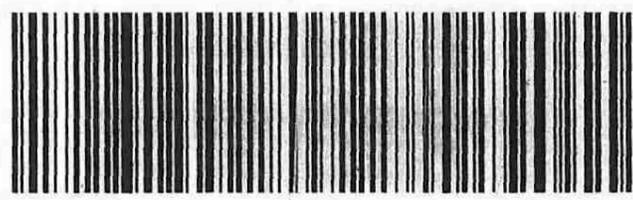


1 of 2  
 TRK# 4137 2536 4562  
 0201  
 ## MASTER ##

**TUE - 09 OCT 10:30A**  
**PRIORITY OVERNIGHT**

**XH BLUA**

**95605**  
**CA-US SMF**



FT 362  
10-30  
A  
10-27

Part # 159469-434 RIT2 EXP 07/19

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
998271

ORIGIN ID:LDJA (732) 549-3900  
KENNETH RIVERA/SAMPLE RECEIVING  
TESTAMERICA EDISON  
777 NEW DURHAM ROAD

SHIP DATE: 08OCT18  
ACTWGT: 70.75 LB  
CAD: 0358159/CAFE3211

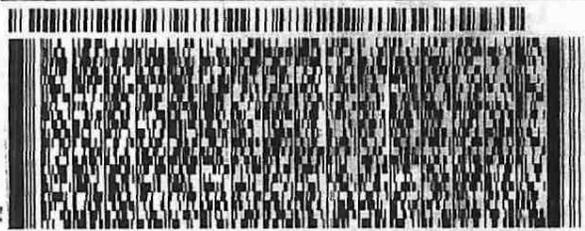
EDISON, NJ 08817  
UNITED STATES US

BILL RECIPIENT

TO **SAMPLE CUSTODY**  
**TEST AMERICA SACRAMENTO**  
**880 RIVERSIDE PARKWAY**

**WEST SACRAMENTO CA 956051500**

INU: REF: DEPT:  
PO:

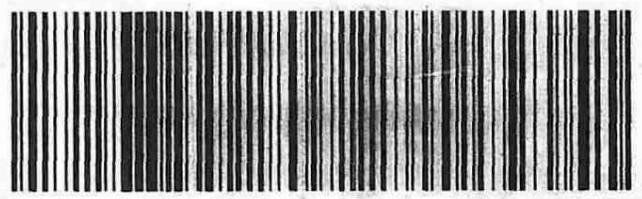


2 of 2  
MPS# 4137 2536 4573  
0263  
Mstr# 4137 2536 4562

**TUE - 09 OCT 10:30A**  
**PRIORITY OVERNIGHT**

**XH BLUA**

**95605**  
**CA-US SMF**



## Login Sample Receipt Checklist

Client: Brookhaven National Labs

Job Number: 160-31214-1

SDG Number: PFAS

**Login Number: 31214**

**List Source: TestAmerica St. Louis**

**List Number: 1**

**Creator: McKinney, Gerrod E**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.0°C; 0.5°C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Login Sample Receipt Checklist

Client: Brookhaven National Labs

Job Number: 160-31214-1

SDG Number: PFAS

**Login Number: 31214**

**List Number: 2**

**Creator: Nelson, Kym D**

**List Source: TestAmerica Sacramento**

**List Creation: 10/09/18 03:29 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	998272, 998271
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.0C, 0.5C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Login Sample Receipt Checklist

Client: Brookhaven National Labs

Job Number: 160-31214-1

SDG Number: PFAS

**Login Number: 31214**

**List Number: 3**

**Creator: Long, Tyrel W**

**List Source: TestAmerica Sacramento**

**List Creation: 10/13/18 11:12 AM**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.		
The cooler's custody seal, if present, is intact.		
Sample custody seals, if present, are intact.		
The cooler or samples do not appear to have been compromised or tampered with.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
Is the Field Sampler's name present on COC?		
There are no discrepancies between the containers received and the COC.		
Samples are received within Holding Time (excluding tests with immediate HTs)		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
Appropriate sample containers are used.		
Sample bottles are completely filled.		
Sample Preservation Verified.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").		
Multiphasic samples are not present.		
Samples do not require splitting or compositing.		
Residual Chlorine Checked.		

## Login Sample Receipt Checklist

Client: Brookhaven National Labs

Job Number: 160-31214-1

SDG Number: PFAS

**Login Number: 31214**

**List Number: 4**

**Creator: Nelson, Kym D**

**List Source: TestAmerica Sacramento**

**List Creation: 10/15/18 09:42 AM**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

# Definitions/Glossary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## Qualifiers

### LCMS

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Estimated: The analyte was positively identified; the quantitation is an estimation

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Method Summary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

Method	Method Description	Protocol	Laboratory
WS-LC-0025 Att1	Fluorinated Alkyl Substances	TAL-SAC	TAL SAC
PFAS Prep	Preparation, Direct Inject PFAS	TAL-SAC	TAL SAC

**Protocol References:**

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

**Laboratory References:**

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



# Sample Summary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-31214-2	199-929-181001 BR030R	Water	10/01/18 09:20	10/09/18 09:24
160-31214-3	199-929-181001 BR030RDUP	Water	10/01/18 09:20	10/09/18 09:24
160-31214-4	001-929-181001 BR021GACION	Water	10/01/18 10:15	10/09/18 09:24
160-31214-5	200-929-181001 BR021R	Water	10/01/18 10:30	10/09/18 09:24
160-31214-6	003-929-181001 BR041GACION	Water	10/01/18 11:30	10/09/18 09:24
160-31214-7	201-929-181001 BR041R	Water	10/01/18 11:45	10/09/18 09:24
160-31214-8	202-929-181001 BR041R	Water	10/01/18 12:00	10/09/18 09:24
160-31214-28	EB-929-181002	Water	10/02/18 09:30	10/09/18 09:24
160-31214-29	203-929-181002 BR017R	Water	10/02/18 09:30	10/09/18 09:24
160-31214-30	203-929-181002 BR017RDUP	Water	10/02/18 09:30	10/09/18 09:24
160-31214-31	001-929-181002 BR017GACIONPH	Water	10/02/18 10:00	10/09/18 09:24
160-31214-32	002-929-181002 BR017ROGACIONPH	Water	10/02/18 10:10	10/09/18 09:24
160-31214-33	204-929-181002 BR037R	Water	10/02/18 10:35	10/09/18 09:24

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: 199-929-181001 BR030R**

**Lab Sample ID: 160-31214-2**

Date Collected: 10/01/18 09:20

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 03:01	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 03:01	1
<b>Perfluoroheptanoic acid (PFHpA)</b>	<b>1.6</b>	<b>J</b>	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 03:01	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>3.6</b>		2.0	0.75 ng/L		10/19/18 12:49	10/21/18 03:01	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 03:01	1
<b>Perfluorononanoic acid (PFNA)</b>	<b>0.84</b>	<b>J</b>	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 03:01	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	97		25 - 150			10/19/18 12:49	10/21/18 03:01	1
13C4 PFHpA	111		25 - 150			10/19/18 12:49	10/21/18 03:01	1
13C4 PFOA	117		70 - 130			10/19/18 12:49	10/21/18 03:01	1
13C4 PFOS	96		70 - 130			10/19/18 12:49	10/21/18 03:01	1
13C5 PFNA	118		25 - 150			10/19/18 12:49	10/21/18 03:01	1

**Client Sample ID: 199-929-181001 BR030RDUP**

**Lab Sample ID: 160-31214-3**

Date Collected: 10/01/18 09:20

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 03:56	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 03:56	1
<b>Perfluoroheptanoic acid (PFHpA)</b>	<b>1.4</b>	<b>J</b>	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 03:56	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>3.4</b>		2.0	0.75 ng/L		10/19/18 12:49	10/21/18 03:56	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 03:56	1
<b>Perfluorononanoic acid (PFNA)</b>	<b>0.76</b>	<b>J</b>	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 03:56	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150			10/19/18 12:49	10/21/18 03:56	1
13C4 PFHpA	123		25 - 150			10/19/18 12:49	10/21/18 03:56	1
13C4 PFOA	133		70 - 130			10/19/18 12:49	10/21/18 03:56	1
13C4 PFOS	108		70 - 130			10/19/18 12:49	10/21/18 03:56	1
13C5 PFNA	133		25 - 150			10/19/18 12:49	10/21/18 03:56	1

**Client Sample ID: 001-929-181001 BR021GACION**

**Lab Sample ID: 160-31214-4**

Date Collected: 10/01/18 10:15

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanesulfonic acid (PFBS)</b>	<b>8.5</b>		2.0	0.92 ng/L		10/19/18 12:49	10/21/18 04:14	1
<b>Perfluorohexanesulfonic acid (PFHxS)</b>	<b>3.9</b>		2.0	0.87 ng/L		10/19/18 12:49	10/21/18 04:14	1
<b>Perfluoroheptanoic acid (PFHpA)</b>	<b>4.4</b>		2.0	0.80 ng/L		10/19/18 12:49	10/21/18 04:14	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>12</b>		2.0	0.75 ng/L		10/19/18 12:49	10/21/18 04:14	1
<b>Perfluorooctanesulfonic acid (PFOS)</b>	<b>2.3</b>		2.0	1.3 ng/L		10/19/18 12:49	10/21/18 04:14	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 04:14	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150			10/19/18 12:49	10/21/18 04:14	1
13C4 PFHpA	120		25 - 150			10/19/18 12:49	10/21/18 04:14	1

TestAmerica St. Louis

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: 001-929-181001 BR021GACION**

**Lab Sample ID: 160-31214-4**

Date Collected: 10/01/18 10:15

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances (Continued)**

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	137		70 - 130	10/19/18 12:49	10/21/18 04:14	1
13C4 PFOS	106		70 - 130	10/19/18 12:49	10/21/18 04:14	1
13C5 PFNA	128		25 - 150	10/19/18 12:49	10/21/18 04:14	1

**Client Sample ID: 200-929-181001 BR021R**

**Lab Sample ID: 160-31214-5**

Date Collected: 10/01/18 10:30

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	8.1		2.0	0.92 ng/L		10/19/18 12:49	10/21/18 04:32	1
Perfluorohexanesulfonic acid (PFHxS)	3.8		2.0	0.87 ng/L		10/19/18 12:49	10/21/18 04:32	1
Perfluoroheptanoic acid (PFHpA)	4.4		2.0	0.80 ng/L		10/19/18 12:49	10/21/18 04:32	1
Perfluorooctanoic acid (PFOA)	12		2.0	0.75 ng/L		10/19/18 12:49	10/21/18 04:32	1
Perfluorooctanesulfonic acid (PFOS)	2.1		2.0	1.3 ng/L		10/19/18 12:49	10/21/18 04:32	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 04:32	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	116		25 - 150	10/19/18 12:49	10/21/18 04:32	1
13C4 PFHpA	124		25 - 150	10/19/18 12:49	10/21/18 04:32	1
13C4 PFOA	137		70 - 130	10/19/18 12:49	10/21/18 04:32	1
13C4 PFOS	112		70 - 130	10/19/18 12:49	10/21/18 04:32	1
13C5 PFNA	131		25 - 150	10/19/18 12:49	10/21/18 04:32	1

**Client Sample ID: 003-929-181001 BR041GACION**

**Lab Sample ID: 160-31214-6**

Date Collected: 10/01/18 11:30

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 04:51	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 04:51	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 04:51	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/19/18 12:49	10/21/18 04:51	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 04:51	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 04:51	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	103		25 - 150	10/19/18 12:49	10/21/18 04:51	1
13C4 PFHpA	111		25 - 150	10/19/18 12:49	10/21/18 04:51	1
13C4 PFOA	123		70 - 130	10/19/18 12:49	10/21/18 04:51	1
13C4 PFOS	97		70 - 130	10/19/18 12:49	10/21/18 04:51	1
13C5 PFNA	120		25 - 150	10/19/18 12:49	10/21/18 04:51	1

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: 201-929-181001 BR041R**

**Lab Sample ID: 160-31214-7**

**Date Collected: 10/01/18 11:45**

**Matrix: Water**

**Date Received: 10/09/18 09:24**

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 05:27	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 05:27	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 05:27	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/19/18 12:49	10/21/18 05:27	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 05:27	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 05:27	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	117		25 - 150			10/19/18 12:49	10/21/18 05:27	1
13C4 PFHpA	124		25 - 150			10/19/18 12:49	10/21/18 05:27	1
13C4 PFOA	137		70 - 130			10/19/18 12:49	10/21/18 05:27	1
13C4 PFOS	112		70 - 130			10/19/18 12:49	10/21/18 05:27	1
13C5 PFNA	135		25 - 150			10/19/18 12:49	10/21/18 05:27	1

**Client Sample ID: 202-929-181001 BR041R**

**Lab Sample ID: 160-31214-8**

**Date Collected: 10/01/18 12:00**

**Matrix: Water**

**Date Received: 10/09/18 09:24**

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 05:46	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 05:46	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 05:46	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/19/18 12:49	10/21/18 05:46	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 05:46	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 05:46	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150			10/19/18 12:49	10/21/18 05:46	1
13C4 PFHpA	122		25 - 150			10/19/18 12:49	10/21/18 05:46	1
13C4 PFOA	135		70 - 130			10/19/18 12:49	10/21/18 05:46	1
13C4 PFOS	111		70 - 130			10/19/18 12:49	10/21/18 05:46	1
13C5 PFNA	137		25 - 150			10/19/18 12:49	10/21/18 05:46	1

**Client Sample ID: EB-929-181002**

**Lab Sample ID: 160-31214-28**

**Date Collected: 10/02/18 09:30**

**Matrix: Water**

**Date Received: 10/09/18 09:24**

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/20/18 11:51	10/23/18 16:06	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/20/18 11:51	10/23/18 16:06	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/20/18 11:51	10/23/18 16:06	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/20/18 11:51	10/23/18 16:06	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/20/18 11:51	10/23/18 16:06	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/20/18 11:51	10/23/18 16:06	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	112		25 - 150			10/20/18 11:51	10/23/18 16:06	1
13C4 PFHpA	115		25 - 150			10/20/18 11:51	10/23/18 16:06	1
13C4 PFOA	125		70 - 130			10/20/18 11:51	10/23/18 16:06	1
13C4 PFOS	102		70 - 130			10/20/18 11:51	10/23/18 16:06	1

TestAmerica St. Louis

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: EB-929-181002**

**Lab Sample ID: 160-31214-28**

Date Collected: 10/02/18 09:30

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances (Continued)**

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	120		25 - 150	10/20/18 11:51	10/23/18 16:06	1

**Client Sample ID: 203-929-181002 BR017R**

**Lab Sample ID: 160-31214-29**

Date Collected: 10/02/18 09:30

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	36		2.0	0.92 ng/L		10/20/18 11:51	10/23/18 16:25	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87 ng/L		10/20/18 11:51	10/23/18 16:25	1
Perfluoroheptanoic acid (PFHpA)	64		2.0	0.80 ng/L		10/20/18 11:51	10/23/18 16:25	1
Perfluorooctanoic acid (PFOA)	23		2.0	0.75 ng/L		10/20/18 11:51	10/23/18 16:25	1
Perfluorooctanesulfonic acid (PFOS)	1.6	J	2.0	1.3 ng/L		10/20/18 11:51	10/23/18 16:25	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/20/18 11:51	10/23/18 16:25	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	107		25 - 150	10/20/18 11:51	10/23/18 16:25	1
13C4 PFHpA	113		25 - 150	10/20/18 11:51	10/23/18 16:25	1
13C4 PFOA	123		70 - 130	10/20/18 11:51	10/23/18 16:25	1
13C4 PFOS	98		70 - 130	10/20/18 11:51	10/23/18 16:25	1
13C5 PFNA	118		25 - 150	10/20/18 11:51	10/23/18 16:25	1

**Client Sample ID: 203-929-181002 BR017RDUP**

**Lab Sample ID: 160-31214-30**

Date Collected: 10/02/18 09:30

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	34		2.0	0.92 ng/L		10/20/18 11:51	10/23/18 17:20	1
Perfluorohexanesulfonic acid (PFHxS)	130		2.0	0.87 ng/L		10/20/18 11:51	10/23/18 17:20	1
Perfluoroheptanoic acid (PFHpA)	62		2.0	0.80 ng/L		10/20/18 11:51	10/23/18 17:20	1
Perfluorooctanoic acid (PFOA)	22		2.0	0.75 ng/L		10/20/18 11:51	10/23/18 17:20	1
Perfluorooctanesulfonic acid (PFOS)	1.3	J	2.0	1.3 ng/L		10/20/18 11:51	10/23/18 17:20	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/20/18 11:51	10/23/18 17:20	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	107		25 - 150	10/20/18 11:51	10/23/18 17:20	1
13C4 PFHpA	113		25 - 150	10/20/18 11:51	10/23/18 17:20	1
13C4 PFOA	119		70 - 130	10/20/18 11:51	10/23/18 17:20	1
13C4 PFOS	103		70 - 130	10/20/18 11:51	10/23/18 17:20	1
13C5 PFNA	118		25 - 150	10/20/18 11:51	10/23/18 17:20	1

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: 001-929-181002 BR017GACIONPH**

**Lab Sample ID: 160-31214-31**

Date Collected: 10/02/18 10:00

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.8		2.0	0.92 ng/L		10/20/18 11:51	10/23/18 17:38	1
Perfluorohexanesulfonic acid (PFHxS)	3.4		2.0	0.87 ng/L		10/20/18 11:51	10/23/18 17:38	1
Perfluoroheptanoic acid (PFHpA)	4.1		2.0	0.80 ng/L		10/20/18 11:51	10/23/18 17:38	1
Perfluorooctanoic acid (PFOA)	2.0 U		2.0	0.75 ng/L		10/20/18 11:51	10/23/18 17:38	1
Perfluorooctanesulfonic acid (PFOS)	2.0 U		2.0	1.3 ng/L		10/20/18 11:51	10/23/18 17:38	1
Perfluorononanoic acid (PFNA)	2.0 U		2.0	0.65 ng/L		10/20/18 11:51	10/23/18 17:38	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150			10/20/18 11:51	10/23/18 17:38	1
13C4 PFHpA	121		25 - 150			10/20/18 11:51	10/23/18 17:38	1
13C4 PFOA	126		70 - 130			10/20/18 11:51	10/23/18 17:38	1
13C4 PFOS	106		70 - 130			10/20/18 11:51	10/23/18 17:38	1
13C5 PFNA	125		25 - 150			10/20/18 11:51	10/23/18 17:38	1

**Client Sample ID: 002-929-181002 BR017ROGACIONPH**

**Lab Sample ID: 160-31214-32**

Date Collected: 10/02/18 10:10

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0 U		2.0	0.92 ng/L		10/20/18 11:51	10/23/18 18:15	1
Perfluorohexanesulfonic acid (PFHxS)	2.0 U		2.0	0.87 ng/L		10/20/18 11:51	10/23/18 18:15	1
Perfluoroheptanoic acid (PFHpA)	2.0 U		2.0	0.80 ng/L		10/20/18 11:51	10/23/18 18:15	1
Perfluorooctanoic acid (PFOA)	2.0 U		2.0	0.75 ng/L		10/20/18 11:51	10/23/18 18:15	1
Perfluorooctanesulfonic acid (PFOS)	2.0 U		2.0	1.3 ng/L		10/20/18 11:51	10/23/18 18:15	1
Perfluorononanoic acid (PFNA)	2.0 U		2.0	0.65 ng/L		10/20/18 11:51	10/23/18 18:15	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	109		25 - 150			10/20/18 11:51	10/23/18 18:15	1
13C4 PFHpA	118		25 - 150			10/20/18 11:51	10/23/18 18:15	1
13C4 PFOA	123		70 - 130			10/20/18 11:51	10/23/18 18:15	1
13C4 PFOS	101		70 - 130			10/20/18 11:51	10/23/18 18:15	1
13C5 PFNA	118		25 - 150			10/20/18 11:51	10/23/18 18:15	1

**Client Sample ID: 204-929-181002 BR037R**

**Lab Sample ID: 160-31214-33**

Date Collected: 10/02/18 10:35

Matrix: Water

Date Received: 10/09/18 09:24

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances**

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0 U		2.0	0.92 ng/L		10/20/18 11:51	10/23/18 18:33	1
Perfluorohexanesulfonic acid (PFHxS)	2.0 U		2.0	0.87 ng/L		10/20/18 11:51	10/23/18 18:33	1
Perfluoroheptanoic acid (PFHpA)	2.0 U		2.0	0.80 ng/L		10/20/18 11:51	10/23/18 18:33	1
Perfluorooctanoic acid (PFOA)	2.0 U		2.0	0.75 ng/L		10/20/18 11:51	10/23/18 18:33	1
Perfluorooctanesulfonic acid (PFOS)	2.0 U		2.0	1.3 ng/L		10/20/18 11:51	10/23/18 18:33	1
Perfluorononanoic acid (PFNA)	2.0 U		2.0	0.65 ng/L		10/20/18 11:51	10/23/18 18:33	1
Isotope Dilution	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150			10/20/18 11:51	10/23/18 18:33	1
13C4 PFHpA	119		25 - 150			10/20/18 11:51	10/23/18 18:33	1
13C4 PFOA	122		70 - 130			10/20/18 11:51	10/23/18 18:33	1

TestAmerica St. Louis

# Client Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

**Client Sample ID: 204-929-181002 BR037R**

**Lab Sample ID: 160-31214-33**

**Date Collected: 10/02/18 10:35**

**Matrix: Water**

**Date Received: 10/09/18 09:24**

**Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances (Continued)**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C4 PFOS	102		70 - 130	10/20/18 11:51	10/23/18 18:33	1
13C5 PFNA	124		25 - 150	10/20/18 11:51	10/23/18 18:33	1

# QC Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

**Lab Sample ID: MB 320-253428/1-A**

**Matrix: Water**

**Analysis Batch: 253662**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 253428**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/19/18 12:49	10/21/18 02:06	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/19/18 12:49	10/21/18 02:06	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/19/18 12:49	10/21/18 02:06	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/19/18 12:49	10/21/18 02:06	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/19/18 12:49	10/21/18 02:06	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/19/18 12:49	10/21/18 02:06	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	108		25 - 150	10/19/18 12:49	10/21/18 02:06	1
13C4 PFHpA	116		25 - 150	10/19/18 12:49	10/21/18 02:06	1
13C4 PFOA	120		70 - 130	10/19/18 12:49	10/21/18 02:06	1
13C4 PFOS	105		70 - 130	10/19/18 12:49	10/21/18 02:06	1
13C5 PFNA	124		25 - 150	10/19/18 12:49	10/21/18 02:06	1

**Lab Sample ID: LCS 320-253428/2-A**

**Matrix: Water**

**Analysis Batch: 253662**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 253428**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	17.7	17.2		ng/L		97	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.7		ng/L		97	73 - 157
Perfluoroheptanoic acid (PFHpA)	20.0	18.8		ng/L		94	71 - 138
Perfluorooctanoic acid (PFOA)	20.0	18.4		ng/L		92	70 - 130
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	70 - 130
Perfluorononanoic acid (PFNA)	20.0	18.3		ng/L		92	73 - 147

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	110		25 - 150
13C4 PFHpA	114		25 - 150
13C4 PFOA	121		70 - 130
13C4 PFOS	109		70 - 130
13C5 PFNA	122		25 - 150

**Lab Sample ID: 160-31214-2 MS**

**Matrix: Water**

**Analysis Batch: 253662**

**Client Sample ID: 199-929-181001 BR030R**

**Prep Type: Total/NA**

**Prep Batch: 253428**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Perfluorobutanesulfonic acid (PFBS)	2.0	U	17.6	16.9		ng/L		96	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	18.2	16.6		ng/L		92	73 - 157
Perfluoroheptanoic acid (PFHpA)	1.6	J	20.0	18.7		ng/L		86	71 - 138
Perfluorooctanoic acid (PFOA)	3.6		20.0	19.7		ng/L		80	70 - 130
Perfluorooctanesulfonic acid (PFOS)	2.0	U	18.5	13.8		ng/L		75	70 - 130
Perfluorononanoic acid (PFNA)	0.84	J	20.0	16.5		ng/L		78	73 - 147

TestAmerica St. Louis

# QC Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>MS MS Qualifier</i>	<i>Limits</i>
18O2 PFHxS	110		25 - 150
13C4 PFHpA	121		25 - 150
13C4 PFOA	128		70 - 130
13C4 PFOS	110		70 - 130
13C5 PFNA	127		25 - 150

**Lab Sample ID: 160-31214-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 253662**

**Client Sample ID: 199-929-181001 BR030R**  
**Prep Type: Total/NA**  
**Prep Batch: 253428**

<i>Analyte</i>	<i>Sample Result</i>	<i>Sample Qualifier</i>	<i>Spike Added</i>	<i>MSD Result</i>	<i>MSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>	<i>RPD</i>	<i>Limit</i>
Perfluorobutanesulfonic acid (PFBS)	2.0	U	17.5	18.3		ng/L		104	72 - 151	8	30
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	18.0	17.6		ng/L		98	73 - 157	6	30
Perfluoroheptanoic acid (PFHpA)	1.6	J	19.8	20.7		ng/L		96	71 - 138	10	30
Perfluorooctanoic acid (PFOA)	3.6		19.8	20.2		ng/L		83	70 - 130	2	20
Perfluorooctanesulfonic acid (PFOS)	2.0	U	18.4	15.7		ng/L		85	70 - 130	13	20
Perfluorononanoic acid (PFNA)	0.84	J	19.8	18.4		ng/L		89	73 - 147	11	30

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>MSD MS Qualifier</i>	<i>Limits</i>
18O2 PFHxS	109		25 - 150
13C4 PFHpA	117		25 - 150
13C4 PFOA	132		70 - 130
13C4 PFOS	103		70 - 130
13C5 PFNA	126		25 - 150

**Lab Sample ID: MB 320-253656/1-A**  
**Matrix: Water**  
**Analysis Batch: 254022**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 253656**

<i>Analyte</i>	<i>MB Result</i>	<i>MB Qualifier</i>	<i>RL</i>	<i>Unit</i>	<i>D</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Perfluorobutanesulfonic acid (PFBS)	2.0	U	2.0	0.92 ng/L		10/20/18 11:51	10/23/18 11:31	1
Perfluorohexanesulfonic acid (PFHxS)	2.0	U	2.0	0.87 ng/L		10/20/18 11:51	10/23/18 11:31	1
Perfluoroheptanoic acid (PFHpA)	2.0	U	2.0	0.80 ng/L		10/20/18 11:51	10/23/18 11:31	1
Perfluorooctanoic acid (PFOA)	2.0	U	2.0	0.75 ng/L		10/20/18 11:51	10/23/18 11:31	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	2.0	1.3 ng/L		10/20/18 11:51	10/23/18 11:31	1
Perfluorononanoic acid (PFNA)	2.0	U	2.0	0.65 ng/L		10/20/18 11:51	10/23/18 11:31	1

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>MB MB Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	109		25 - 150	10/20/18 11:51	10/23/18 11:31	1
13C4 PFHpA	103		25 - 150	10/20/18 11:51	10/23/18 11:31	1
13C4 PFOA	116		70 - 130	10/20/18 11:51	10/23/18 11:31	1
13C4 PFOS	107		70 - 130	10/20/18 11:51	10/23/18 11:31	1
13C5 PFNA	109		25 - 150	10/20/18 11:51	10/23/18 11:31	1

**Lab Sample ID: LCS 320-253656/2-A**  
**Matrix: Water**  
**Analysis Batch: 254022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 253656**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCS Result</i>	<i>LCS Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>Limits</i>
Perfluorobutanesulfonic acid (PFBS)	17.7	17.9		ng/L		101	72 - 151
Perfluorohexanesulfonic acid (PFHxS)	18.2	17.9		ng/L		98	73 - 157

TestAmerica St. Louis

# QC Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances (Continued)

**Lab Sample ID: LCS 320-253656/2-A**  
**Matrix: Water**  
**Analysis Batch: 254022**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 253656**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluoroheptanoic acid (PFHpA)	20.0	18.7		ng/L		93	71 - 138		
Perfluorooctanoic acid (PFOA)	20.0	18.7		ng/L		93	70 - 130		
Perfluorooctanesulfonic acid (PFOS)	18.6	17.7		ng/L		95	70 - 130		
Perfluorononanoic acid (PFNA)	20.0	19.2		ng/L		96	73 - 147		
		<b>LCS LCS</b>							
<b>Isotope Dilution</b>		<b>%Recovery</b>	<b>Qualifier</b>			<b>Limits</b>			
18O2 PFHxS		111				25 - 150			
13C4 PFHpA		108				25 - 150			
13C4 PFOA		115				70 - 130			
13C4 PFOS		108				70 - 130			
13C5 PFNA		112				25 - 150			

**Lab Sample ID: 160-31214-29 MS**  
**Matrix: Water**  
**Analysis Batch: 254022**

**Client Sample ID: 203-929-181002 BR017R**  
**Prep Type: Total/NA**  
**Prep Batch: 253656**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	
Perfluorobutanesulfonic acid (PFBS)	36		17.6	54.1		ng/L		105	72 - 151	
Perfluorohexanesulfonic acid (PFHxS)	130		18.1	140		ng/L		48	73 - 157	
Perfluoroheptanoic acid (PFHpA)	64		19.9	82.0		ng/L		92	71 - 138	
Perfluorooctanoic acid (PFOA)	23		19.9	40.0		ng/L		88	70 - 130	
Perfluorooctanesulfonic acid (PFOS)	1.6	J	18.4	17.3		ng/L		86	70 - 130	
Perfluorononanoic acid (PFNA)	2.0	U	19.9	17.4		ng/L		88	73 - 147	
		<b>MS MS</b>								
<b>Isotope Dilution</b>		<b>%Recovery</b>	<b>Qualifier</b>			<b>Limits</b>				
18O2 PFHxS		109				25 - 150				
13C4 PFHpA		113				25 - 150				
13C4 PFOA		122				70 - 130				
13C4 PFOS		104				70 - 130				
13C5 PFNA		120				25 - 150				

**Lab Sample ID: 160-31214-29 MSD**  
**Matrix: Water**  
**Analysis Batch: 254022**

**Client Sample ID: 203-929-181002 BR017R**  
**Prep Type: Total/NA**  
**Prep Batch: 253656**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD	
											RPD	Limit
Perfluorobutanesulfonic acid (PFBS)	36		17.7	53.8		ng/L		103	72 - 151	0	30	
Perfluorohexanesulfonic acid (PFHxS)	130		18.2	136		ng/L		28	73 - 157	3	30	
Perfluoroheptanoic acid (PFHpA)	64		20.0	77.8		ng/L		71	71 - 138	5	30	
Perfluorooctanoic acid (PFOA)	23		20.0	39.1		ng/L		82	70 - 130	2	20	
Perfluorooctanesulfonic acid (PFOS)	1.6	J	18.6	17.6		ng/L		87	70 - 130	2	20	
Perfluorononanoic acid (PFNA)	2.0	U	20.0	17.6		ng/L		88	73 - 147	1	30	

TestAmerica St. Louis

# QC Sample Results

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

<i>Isotope Dilution</i>	<i>MSD</i>	<i>MSD</i>	<i>Limits</i>
	<i>%Recovery</i>	<i>Qualifier</i>	
<i>18O2 PFHxS</i>	105		25 - 150
<i>13C4 PFHpA</i>	112		25 - 150
<i>13C4 PFOA</i>	120		70 - 130
<i>13C4 PFOS</i>	100		70 - 130
<i>13C5 PFNA</i>	118		25 - 150

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# QC Association Summary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## LCMS

### Prep Batch: 253428

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31214-2	199-929-181001 BR030R	Total/NA	Water	PFAS Prep	
160-31214-3	199-929-181001 BR030RDUP	Total/NA	Water	PFAS Prep	
160-31214-4	001-929-181001 BR021GACION	Total/NA	Water	PFAS Prep	
160-31214-5	200-929-181001 BR021R	Total/NA	Water	PFAS Prep	
160-31214-6	003-929-181001 BR041GACION	Total/NA	Water	PFAS Prep	
160-31214-7	201-929-181001 BR041R	Total/NA	Water	PFAS Prep	
160-31214-8	202-929-181001 BR041R	Total/NA	Water	PFAS Prep	
MB 320-253428/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-253428/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
160-31214-2 MS	199-929-181001 BR030R	Total/NA	Water	PFAS Prep	
160-31214-2 MSD	199-929-181001 BR030R	Total/NA	Water	PFAS Prep	

### Prep Batch: 253656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31214-28	EB-929-181002	Total/NA	Water	PFAS Prep	
160-31214-29	203-929-181002 BR017R	Total/NA	Water	PFAS Prep	
160-31214-30	203-929-181002 BR017RDUP	Total/NA	Water	PFAS Prep	
160-31214-31	001-929-181002 BR017GACIONPH	Total/NA	Water	PFAS Prep	
160-31214-32	002-929-181002 BR017ROGACIONPH	Total/NA	Water	PFAS Prep	
160-31214-33	204-929-181002 BR037R	Total/NA	Water	PFAS Prep	
MB 320-253656/1-A	Method Blank	Total/NA	Water	PFAS Prep	
LCS 320-253656/2-A	Lab Control Sample	Total/NA	Water	PFAS Prep	
160-31214-29 MS	203-929-181002 BR017R	Total/NA	Water	PFAS Prep	
160-31214-29 MSD	203-929-181002 BR017R	Total/NA	Water	PFAS Prep	

### Analysis Batch: 253662

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31214-2	199-929-181001 BR030R	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-3	199-929-181001 BR030RDUP	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-4	001-929-181001 BR021GACION	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-5	200-929-181001 BR021R	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-6	003-929-181001 BR041GACION	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-7	201-929-181001 BR041R	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-8	202-929-181001 BR041R	Total/NA	Water	WS-LC-0025 Att1	253428
MB 320-253428/1-A	Method Blank	Total/NA	Water	WS-LC-0025 Att1	253428
LCS 320-253428/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-2 MS	199-929-181001 BR030R	Total/NA	Water	WS-LC-0025 Att1	253428
160-31214-2 MSD	199-929-181001 BR030R	Total/NA	Water	WS-LC-0025 Att1	253428

### Analysis Batch: 254022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31214-28	EB-929-181002	Total/NA	Water	WS-LC-0025 Att1	253656

TestAmerica St. Louis

# QC Association Summary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## LCMS (Continued)

### Analysis Batch: 254022 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31214-29	203-929-181002 BR017R	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-30	203-929-181002 BR017RDUP	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-31	001-929-181002 BR017GACIONPH	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-32	002-929-181002 BR017ROGACIONPH	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-33	204-929-181002 BR037R	Total/NA	Water	WS-LC-0025 Att1	253656
MB 320-253656/1-A	Method Blank	Total/NA	Water	WS-LC-0025 Att1	253656
LCS 320-253656/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-29 MS	203-929-181002 BR017R	Total/NA	Water	WS-LC-0025 Att1	253656
160-31214-29 MSD	203-929-181002 BR017R	Total/NA	Water	WS-LC-0025 Att1	253656

# Isotope Dilution Summary

Client: Brookhaven National Labs  
Project/Site: BNL - PFAS

TestAmerica Job ID: 160-31214-1  
SDG: PFAS

## Method: WS-LC-0025 Att1 - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Isotope Dilution Recovery (Acceptance Limits)				
		PFHxS (25-150)	PFHpA (25-150)	PFOA (70-130)	PFOS (70-130)	PFNA (25-150)
160-31214-2	199-929-181001 BR030R	97	111	117	96	118
160-31214-2 MS	199-929-181001 BR030R	110	121	128	110	127
160-31214-2 MSD	199-929-181001 BR030R	109	117	132	103	126
160-31214-3	199-929-181001 BR030RDUP	110	123	133	108	133
160-31214-4	001-929-181001 BR021GACION	109	120	137	106	128
160-31214-5	200-929-181001 BR021R	116	124	137	112	131
160-31214-6	003-929-181001 BR041GACION	103	111	123	97	120
160-31214-7	201-929-181001 BR041R	117	124	137	112	135
160-31214-8	202-929-181001 BR041R	113	122	135	111	137
160-31214-28	EB-929-181002	112	115	125	102	120
160-31214-29	203-929-181002 BR017R	107	113	123	98	118
160-31214-29 MS	203-929-181002 BR017R	109	113	122	104	120
160-31214-29 MSD	203-929-181002 BR017R	105	112	120	100	118
160-31214-30	203-929-181002 BR017RDUP	107	113	119	103	118
160-31214-31	001-929-181002 BR017GACIONPH	108	121	126	106	125
160-31214-32	002-929-181002 BR017ROGACIONPH	109	118	123	101	118
160-31214-33	204-929-181002 BR037R	110	119	122	102	124
LCS 320-253428/2-A	Lab Control Sample	110	114	121	109	122
LCS 320-253656/2-A	Lab Control Sample	111	108	115	108	112
MB 320-253428/1-A	Method Blank	108	116	120	105	124
MB 320-253656/1-A	Method Blank	109	103	116	107	109

### Surrogate Legend

PFHxS = 18O2 PFHxS  
PFHpA = 13C4 PFHpA  
PFOA = 13C4 PFOA  
PFOS = 13C4 PFOS  
PFNA = 13C5 PFNA